

EVALUATING THE MARKET FOR
PROGRAMMER TRAINEES IN CENTRAL NEW JERSEY

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Evaluating the Market for
Programmer Trainees in Central
New Jersey (10/81)

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EVALUATING THE MARKET FOR
PROGRAMMER TRAINEES IN
CENTRAL NEW JERSEY

Prepared For:

CONTINENTAL DATA CENTER
CONTINENTAL CORPORATION

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EVALUATING THE MARKET FOR PROGRAMMER TRAINEES IN CENTRAL NEW JERSEY

ABSTRACT

This report analyzes the market for programmer trainees in central New Jersey. Potential employer needs and desires for programmer trainees were analyzed as well as motivations for hiring entry level personnel. Market supply and demand estimates were also made.

EVALUATING THE MARKET FOR PROGRAMMER TRAINEES IN CENTRAL NEW JERSEY

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I MANAGEMENT SUMMARY

I MANAGEMENT SUMMARY

- There is no barrier to Continental Data Center (CDC) entering the commercial programming training market from a marketing standpoint.
 - While employers do not now have a strong perceived need for programming school graduates, schools in the surrounding area are able to place graduates successfully.
 - CDC's geographic position is a problem for planning extensive growth.
 - Satellite locations would be necessary relatively soon.
- The current CDC course is, in general, competitive with other programmer training courses.
 - The CDC course length (three months) is the minimum acceptable length as far as employers are concerned.
- Potential employers/customers would always fear that CDC would skim off the best students.
 - The only feasible approach is the one used at Chubb, where CDC establishes a self-denial policy against hiring students who have entered CDC on their own.

- Successful placement efforts will sometimes place students in positions that could be perceived by Continental trainees as better in terms of salary, work content, opportunity, etc.
 - Recruitment rates for CDC might drop, causing vacancy rates to increase and workload capacity to suffer.
 - CDC might have to increase salary levels for entry level programmers and, possibly, for all staff (to maintain differentials).
 - Consequently, outside students intended for the commercial market must be isolated from students intended for CDC.
- INPUT recommends that any full-fledged commercial training venture be set up along these lines:
 - Start as small as possible, but be geographically distinct from the current training site.
 - Marketing and closely associated market research will be critical to success.
 - Customers must be identified and continually reinforced. A certain minimum amount of human contact will be required.
 - The first batch of graduates must be carefully recruited and equally carefully placed in promising circumstances.
 - Large employers should, naturally, be the chief targets. However, where inexpensive marketing is possible, there is no reason to exclude smaller companies as customers.
 - Personal calls and visits should be confined to large employers.

- . Direct mail (after initial qualification), group seminars, and facility tours should be aimed at a much larger selection of companies.
- CDC should explore with employers the training of entry level staff selected by the customers. These students could be:
 - . Upgraded nonprofessional DP staff.
 - . Company transfers.
 - . New hires.
 - . "Customer-identified" students, whom the employer has agreed to hire if they complete the course satisfactorily. This way the employer would not have to pay a salary to the student until the student was trained.
- CDC should consider offering a few advanced courses aimed at experienced programmers.
 - . This would build up an image of competence more quickly among customer companies.

II INTRODUCTION

II INTRODUCTION

A. BACKGROUND

- The Continental Data Center (CDC) now has an extensive (13-week) training program for entry level programmers.
 - Part of the enrollment is made up of already hired employees and the remainder are outside students. However:
 - Virtually all the outside students are hired by CDC at the conclusion of the course.
 - This fact is known by most or all the entering outside students.
 - Consequently, the training program has more aspects of an in-house training program than of a commercial programmer training school.
- CDC is exploring the possibility of expanding the enrollment of its entry level training program in order to increase its revenues.
- INPUT was requested by CDC to perform a study which assesses the:
 - Propensity of employers to hire trainees for commercial programming (i.e., for COBOL-like applications).

- Value placed on different kinds of education by employers.
- Course of study favored by employers.
- Position of competing schools.
- Approximate number of trainees hired.
- CDC's strengths and weaknesses in this market.
- The study was limited to the immediate four-county area shown in Exhibit II-1.

B. METHODOLOGY

- INPUT used three principal sources for this study:
 - The results of telephone interviews conducted in August 1981.
 - 1978 County Business Patterns for New Jersey.
 - Other INPUT study data.
- The interviews were conducted with 25 employers and 9 computer training schools.
 - The interviews were conducted using structured questionnaires that were reviewed with CDC prior to use.
 - The questionnaire used with employers is shown in Appendix A.
 - The questionnaire used with schools is shown in Appendix B.

EXHIBIT II-1

CONTINENTAL TRAINING CENTER SERVICE AREA



- The employer sample was structured, as shown in Exhibit II-2.
 - This segmentation was used since it was assumed that the larger employers would be the natural target for marketing programmer trainees.
 - However, it was not known if the profiles and attitudes of these employers would be appreciably different from those of other New Jersey employers or equivalent sized Manhattan employers.
 - The large New Jersey employers do in fact appear to have some characteristics which differ from those of other companies interviewed.
 - In the course of the study it was hypothesized that there might be a further small set of companies with very large (50 or 100) programmer staffs involved in commercial data processing that might have differing needs and would in any event represent a large compact market.
 - To test this, CDC supplied a list of companies which it believed might meet this criteria. INPUT was able to contact or otherwise classify over 80% of the companies on the list and none met the criteria, as shown in Appendix C.
 - Bell Labs (Holmdel) is a partial exception in that they have a very large programming staff (at least 750); however, this staff is largely involved in scientific and engineering programming. Most importantly, Bell Labs has a strongly entrenched "not invented here" attitude toward all outside services.
 - The employers interviewed are listed in Appendix D.
 - Over 75% of respondents were data processing managers.

EXHIBIT II-2

EMPLOYER INTERVIEW PROFILE

EMPLOYER SIZE*	NUMBER OF RESPONDENTS
New Jersey	
Under 100	6
100-499	6
500 and Over	8
New York City	
500 and Over	5
Subtotal 500 and Over	13
Total	25

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

- The remainder were other senior staff within the data processing department with hiring/training responsibilities.
- Employers were selected from the sections of Polk's New Jersey Directory for the four-county area, with service-type companies (banks, government, etc.) added from telephone directories to ensure a balance for the type of company interviewed.
- Employers were contacted for interviews in proportion to their distribution across county, as shown in County Business Patterns for 1978.
- The schools interviewed are shown in Appendix E.
- It is believed that the sample includes all programming schools in the four-county area.
- Titles of those interviewed included school directors and data processing department heads.
- In general, the respondents were cooperative.
- The reported numeric data should be treated as having considerable variation since in most cases respondents did not have all their data at hand and would in any event have had to make qualitative judgments (e.g., which programmer/analysts were more programmer than analyst).

III EMPLOYERS

III EMPLOYERS

A. PROFILES

- Not surprisingly, large firms are much more likely to employ programmers than small firms, as shown in Exhibit III-1.
 - Firms with over 500 employees are almost four times as likely to employ at least one programmer than those having between 50 and 99 employees. (Note: Firms having under 50 employees were not included since a pre-interview qualification survey indicated that their percentage was close to zero.)
- The average number of programmers per employer site is relatively small, even for the larger firms, as shown in Exhibit III-2.
 - Even the larger New Jersey sites averaged only around 10 programmers.
 - This is, however, roughly in line with national averages of one or two programmers per site.
 - Note that the smaller firms had a higher average number than the middle group.

EXHIBIT III-1

PERCENT OF COMPANIES EMPLOYING PROGRAMMERS, BY COMPANY SIZE

EMPLOYER SIZE*	PERCENT EMPLOYING PROGRAMMERS AT INTERVIEWED SITE
50-99	22%
100-499	45
500 and Over	83

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

SOURCE: INPUT SURVEY. REPRESENTS FINDINGS OF QUALIFICATION PHASE OF SURVEY. 123 COMPANIES WERE CONTACTED.

EXHIBIT III-2

AVERAGE NUMBER OF PROGRAMMERS

EMPLOYER SIZE*	MEDIAN	MEAN
New Jersey		
Under 100	3.5	3.0
100-499	1.5	1.3
500 and Over	4.0	10.6
New York City		
500 and Over	8.0	7.8
Subtotal Average - 500 and Over	4.0	9.5
Total Average	3.0	6.0

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

- . This could be accounted for by the small samples and small numbers of programmers involved.
 - . Another explanation is tied to the nature of the very small firms. The majority have no programmers at all; when the firm has the need for any programmers (e.g., consulting firm), programming is apt to play a significant role in its business.
- Overall, the hardware used is quite heterogeneous, as shown in Exhibit III-3.
 - As would be expected, the smaller firms used small systems.
 - . There was no particular pattern to the types of small systems used, as shown in Exhibit III-4.
- The software used mirrored the hardware, as shown in Exhibit III-5.
 - DOS is prevalent, even in the larger employers.
 - . In INPUT's opinion, the deserved popularity of DOS/VSE will tend to maintain this prevalence.
- Reported turnover rates are on the low side, especially for New York City employers. This may have been caused by lack of immediately accessible data combined with a desire to downplay turnover.
 - It should be noted that the three-year average for large New Jersey employers (23%) is essentially the same as the widely quoted 25% figure, as shown in Exhibit III-6.
 - . In a 1980 survey of large data processing installations by INPUT, managers indicated an average 35% turnover rate.

EXHIBIT III-3

HARDWARE USED BY INTERVIEWED EMPLOYERS

EMPLOYER SIZE*	NUMBER OF RESPONDENTS USING			
	SMALL SYSTEMS	IBM MAINFRAME		
		4300	360	370
New Jersey				
Under 100	5	1**	1**	1**
100-499	6	0	0	0
500 and Over	2	2	1	6
New York City				
500 and Over	3	1	1	1
Subtotal 500 and Over	5	3	2	7
Total	16	4	3	8

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

**A SINGLE CONSULTING FIRM (i.e., USES MANY TYPES OF CLIENT EQUIPMENT)

NOTE: SEVERAL RESPONDENTS USED MORE THAN ONE TYPE OF MACHINE.

EXHIBIT III-4

SMALL COMPUTERS USED

DEC

IBM System 34

Hewlett-Packard

Perkin-Elmer

IBM System 3

Wang

Datapoint

Data General

EXHIBIT III-5

SOFTWARE USED BY INTERVIEWED EMPLOYERS

EMPLOYER SIZE*	NUMBER OF EMPLOYERS USING		
	SMALL SYSTEM	IBM MAINFRAME	
		DOS	OS
New Jersey			
Under 100	5	1**	1**
100-499	6	0	0
500 and Over	2	5	2
New York City			
500 and Over	3	3	0
Subtotal 500 and Over	5	8	2
Total	16	9	3

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

**CONSULTING FIRM.

EXHIBIT III-6

TURNOVER RATES (percent)

EMPLOYER SIZE*	1979	1980	1981
New Jersey			
Under 100	0	0	0
100-499	17%	0	0
500 and Over	31	19%	18%
New York City			
500 and Over	8	8	8

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

- INPUT tested the hypothesis that programmers left because of not being in a "state of the art" installation.
 - This has an obvious impact on the need for education.
 - However, only a small portion of respondents maintained this, as shown in Exhibit III-7.
 - Few employers currently were taking initiative to reduce turnover, as shown in Exhibit III-8.
 - Again, maintaining the "state of the art" was not perceived as very important.
- It is interesting, though, and ground for cautious optimism that when directly questioned half of large New Jersey employers saw improved training as a means of reducing turnover, as shown in Exhibit III-9.

B. ENTRY LEVEL PROGRAMMER HIRING

- Significant numbers of entry level programmers are hired by employers. Over half of the programmers hired by the respondents were entry level, as shown in Exhibit III-10. (The word "trainee" was avoided in the interviews to avoid counting only those who went to a formal training course; "entry level" was defined as those with no prior full-time paid experience.)
 - Employers have no general prejudice against hiring "trainees," as shown in Exhibit III-11.
- However, the general problem for entry level programmers with no experience (and programmer training schools) is that companies would prefer to hire experienced programmers, as shown in Exhibit III-12.

EXHIBIT III-7

REASONS FOR TURNOVER

REASON	PERCENT OF RESPON- DENTS
Relocation	24%
Salary	48
Employee Wanted "State of Art"	16
Fired	12

NUMBER OF RESPONDENTS = 25

EXHIBIT III-8

INITIATIVES TO
REDUCE TURNOVER

INITIATIVE	PERCENT OF RESPON- DENTS
Maintain State of Art	16%
Administrative Steps	8
None	76

EXHIBIT III-9

EFFECT OF IMPROVED TRAINING ON TURNOVER (percent)

EMPLOYER SIZE*	REDUCES TURNOVER	INCREASES TURNOVER	NO EFFECT	DON'T KNOW
New Jersey				
Under 100	25%	0	0	75%
100-499	25	0	0	75
500 and Over	50	12%	25%	12
New York City				
500 and Over	0	0	40	60
Employers 500 and Over	31%	8%	31%	31%
All Employers	32%	4%	16%	48%

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

EXHIBIT III-10

PROGRAMMERS HIRED, BY 1980

EMPLOYER SIZE*	NUMBER OF PROGRAM- MERS HIRED	PERCENT ENTRY LEVEL
New Jersey		
Under 100	3%	25%
100-499	2	50
500 and Over	13	69
New York City		
500 and Over	5	0
Subtotal 500 and Over	18%	50%
Total	23%	52%

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

EXHIBIT III-11

PERCENT OF COMPANIES HIRING "TRAINEES"

EMPLOYER SIZE*	PERCENT HIRING
New Jersey	
Under 100	50%
100-499	50
500 and Over	100
New York City	
500 and Over	60
Subtotal 500 and Over	85%
Total	68%

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

EXHIBIT III-12

MINIMUM DP EXPERIENCE DESIRED IN TYPICAL HIRE

EMPLOYER SIZE*	YEARS OF EXPERIENCE			
	NONE	ONE	TWO	THREE
New Jersey				
Under 100	17%	33%	50%	0
100-499	33	33	33	0
500 and Over	12	25	50	12
New York City				
500 and Over	0	40	20	40
Employers 500 and Over	8%	31%	38%	23%
All Employers	16%	32%	40%	12%

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

- In reality, though, the large New Jersey companies must accept staff with less experience than they desire, as shown in Exhibit III-13.
- This is, in fact, a nationwide problem. Exhibit III-14 shows that a sample of 50 major, mostly multisite employers must accept twice as many trainees as their desired hiring goal.
 - . This is because data processing growth requirements must, by definition, be filled by trainees (compare upper and lower bars in Exhibit III-14).
- The fact that employers do not generally accept and plan for this state of affairs creates unrealistic expectations.
 - Transfers are often a last resort.
 - As trainees are a perpetual stopgap, the best methods of maximizing their usability and effectiveness are often not considered.
 - . This is discussed further in the next section.

C. EMPLOYER REQUIREMENTS FOR ENTRY LEVEL PROGRAMMERS

- As shown in Exhibit III-12, employers would prefer to hire experienced programmers.
 - In addition, most employers want their typical programmer hire to have experience on their particular hardware, as shown in Exhibit III-15.
 - They also want them to have experience with the same kind of software. COBOL is the language of choice, with Assembler and RPG also popular, as shown in Exhibit III-16.

EXHIBIT III-13

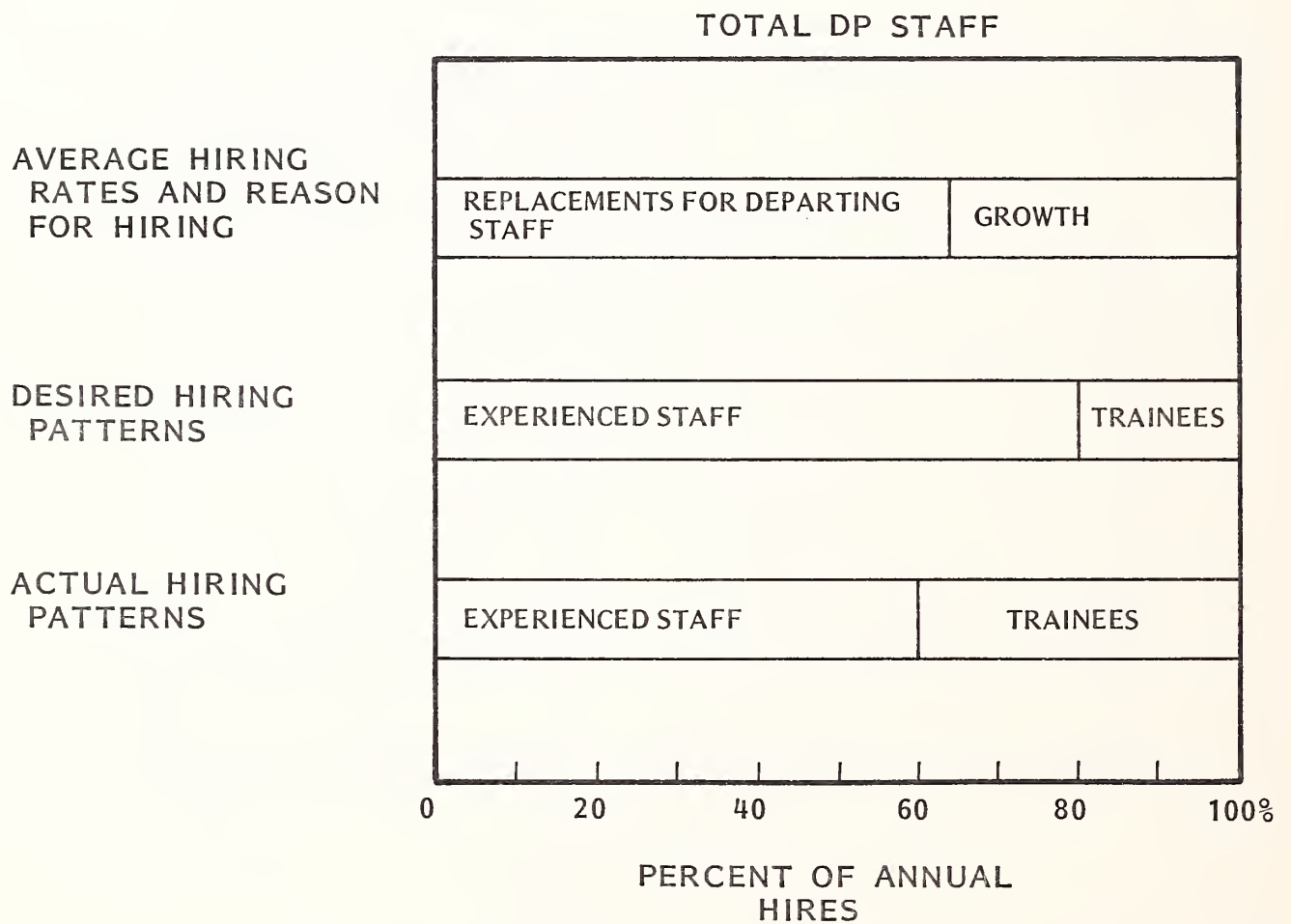
NUMBER OF PROGRAMMERS WITH ONE YEAR OF EXPERIENCE

EMPLOYER SIZE*	PERCENT OF STAFF WITH ONE YEAR OF EXPERIENCE	
	ACTUAL	GOAL
New Jersey		
Under 100	20%	20%
100-499	80	70
500 and Over	53	31
New York City		
500 and Over	15	15

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

EXHIBIT III-14

DATA PROCESSING HIRING IDEALS VERSUS REALITY



SOURCE: INPUT ANALYSIS OF 50 NATIONAL EMPLOYERS.

EXHIBIT III-15

TYPICAL PROGRAMMER HIRE: HARDWARE EXPERIENCE DESIRED BY EMPLOYERS

EMPLOYER SIZE*	NUMBER OF RESPONDENTS DESIRING EXPERIENCE ON THEIR PARTICULAR TYPE OF HARDWARE					
	SMALL SYSTEMS		MAINFRAMES		TOTAL	
	YES	NO	YES	NO	YES	NO
New Jersey						
Under 100	4	1	1	0	5	1
100-499	0	6	0	0	0	6
500 and Over	2	0	4	2	6	2
New York City						
500 and Over	1	0	4	0	5	0
Subtotal 500 and Over	3	0	8	2	11	2
Total	7	7	9	2	16	9

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

Number of Respondents = 25

EXHIBIT III-16

TYPICAL PROGRAMMER HIRE:
LANGUAGE PROFICIENCY DESIRED BY EMPLOYERS

EMPLOYER SIZE*	PERCENT USING					NUMBER OF RE- SPONSES
	COBOL	FORTRAN	ASSEM- BLER	RPG	OTHER	
New Jersey						
Under 100	33%	8%	33%	17%	8%	12%
100-499	17	-	-	67	17	6
500 and Over	42	-	25	25	8	12
New York City						
500 and Over	50	-	17	34	0	6
Subtotal 500 and Over	44%	-	22%	28%	6%	18%
Total	36%	-	25%	31%	8%	36%

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

- The desired education level for programmer hires is fairly high, as shown in Exhibit III-17.
 - Only one-quarter have no requirements above a high-school degree.
 - However, the minimum education requirements are quite different, as shown in Exhibit III-18.
 - College degree requirements drop sharply.
 - A commercial school certificate becomes more valuable.
 - However, the biggest difference is the elimination of education requirements by almost half the respondents.
- This difference between the ideal and the reality was brought out by the general question as to the extent to which respondents aimed at hiring programmers with desired attributes and the extent to which they met these goals.
 - As Exhibit III-19 shows, most companies aimed for their goal, but most missed. Nowhere was the gap bigger than in the large New Jersey employers.

D. EMPLOYER ATTITUDES TOWARD PROGRAMMER EDUCATION IN GENERAL

- The attitudes of employers toward different forms of programming education (and programming education in general) are of the utmost importance in marketing programming school graduates. Equally important, and probably both a cause and effect of such attitudes, are the actual practices of employers.

EXHIBIT III-17

TYPICAL PROGRAMMER HIRE: EDUCATION DESIRED BY EMPLOYERS

EMPLOYER SIZE*	PERCENT OF EMPLOYERS REQUIRING			
	AA	COMMERCIAL PROGRAM- MING SCHOOL	BA	NONE
New Jersey				
Under 100	43%	14%	14%	29%
100-499	57	14	29	0
500 and Under	67	17	17	0
New York City				
500 and Over	20	0	0	80
Employers 500 and Over	53%	12%	12%	24%
All Employers	52%	13%	16%	19%

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

EXHIBIT III-18

MINIMUM EDUCATION REQUIREMENTS FOR PROGRAMMERS

EMPLOYER SIZE*	PERCENT OF EMPLOYERS REQUIRING				
	SOME COLLEGE	AA	COMMERCIAL PROGRAM-MING SCHOOL	BA	NONE
New Jersey					
Under 100	0	33%	17%	0	50%
100-499	0	50	17	0	33
500 and Over	13%	25	25	0	37
New York City					
500 and Over	0	20	20	0	60
Employers 500 and Over	8%	23%	23%	0	46%
All Employers	4%	32%	20%	0	44%

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

EXHIBIT III-19

PROGRAMMER PROFILES: GOALS VERSUS ACHIEVEMENT (percent)

EMPLOYER SIZE*	AIM FOR MAXIMUM GOAL	MEET GOAL
New Jersey		
Under 100	83%	50%
100-499	100	50
500 and Over	75	25
New York City		
500 and Over	100	60

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

Number of respondents = 25

- As shown in Exhibit III-20, employers as a group currently show little preference toward hiring programmers with formal training.
- Of course, this may well be because a greater supply of trained programmers is not available. In the next chapter there is some evidence to support this in the form of high placement rates.
- While the lack of supply may be a factor, there are at present relatively few signs of positive enthusiasm toward programmer training. Since this issue is such an important one for this study, the question was approached in several, overlapping ways:
 - Attitudes toward formal training in general.
 - Importance of different kinds of training to employers.
 - Importance of difference methods used in hiring programmers.
- In general, employers see formal training as being of only medium importance, as shown in Exhibit III-21.
 - Large New Jersey employers are somewhat more favorably disposed to formal training, but not strikingly so.
- A similar picture emerges when looking at particular types of education, as shown in Exhibit III-22.
 - On-the-job training, especially to the large New Jersey employers, is of supreme importance. Instruction manuals and books are of next highest importance, followed by classroom training (which scores a weak medium).
- Finally, there is the relative importance of the various methods of hiring programmers. As shown in Exhibit III-23, the upgrading of nonprofessional

EXHIBIT III-20

PERCENT OF EMPLOYERS WHOSE ENTRY LEVEL PROGRAMMERS GENERALLY HAVE PRIOR FORMAL TRAINING

EMPLOYER SIZE*	PERCENT OF EMPLOYERS
New Jersey	
Under 100	100%
100-499	0
500 and Over	25
New York City	
500 and Over	33
Employers 500 and Over	27%
All Employers	35%

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION

Number of respondents = 17 (i.e., EMPLOYERS INTERVIEWED WHO HIRE
ENTRY LEVEL PROGRAMMERS)

EXHIBIT III-21

IMPORTANCE OF FORMAL TRAINING TO EMPLOYERS

EMPLOYER SIZE*	RATING**
New Jersey	
Under 100	2.2
100-499	3.0
500 and Over	3.5
New York City	
500 and Over	2.0
Employers 500 and Over	2.9
All Employers	2.8

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

**1 = LOW, 5 = HIGH

EXHIBIT III-22

IMPORTANCE OF DIFFERENT TYPES OF
PROGRAMMER EDUCATION TO EMPLOYERS

TYPE OF EDUCATION	IMPORTANCE TO EMPLOYER*	
	ALL FIRMS	LARGE NJ FIRMS
On-Premises Video	1.0	2.0
Instruction Manuals	1.7	3.3
Other Manual	1.6	2.8
Books	1.7	3.3
On-Premises Classes	1.8	2.5
Off-Premises Classes	2.0	2.5
Internal Seminars	1.3	1.3
On-The-Job Training	4.2	5.0

*1 = LOW, 5 = HIGH

EXHIBIT III-23

IMPORTANCE TO EMPLOYERS OF METHODS OF HIRING PROGRAMMERS

HIRING METHOD	IMPORTANCE TO EMPLOYER*	
	ALL FIRMS	LARGE NJ FIRMS
Internal Company Transfer	2.6	3.6
Nonprofessional DP Staff Upgrade	2.9	4.4
Referrals	1.5	2.0
Walk-In	1.7	2.3
Newspaper Ad	4.0	4.3
Employment Agency	3.0	3.7
Co-Op Education	2.0	2.9
Degree Programs	2.1	3.3
Commercial Schools	2.1	2.9

*1 = LOW, 5 = HIGH

members of the data processing staff and newspaper ads are the most important methods for large New Jersey firms. This is followed by employment agencies and internal company transfers.

- Commercial schools rank among the less important means.
- It should be noted at this point that most firms (80%) interviewed conduct no testing of entry level programmers.
- The picture that emerges is one of data processing management that has little use - in both theory and practice - for formal education. This is tempered somewhat by the high importance of internal recruitment (both within and outside of the data processing department).
 - This makes more explicable the disregard for testing and the high premium placed on on-the-job training. The entry level programmers are known entities who have high motivation and, in many cases, will have already become educated in the basics by self-study and on-the-job exposure.
 - In this context, continued self-study and on-the-job training make sense and are not as retrogressive as they may appear on the surface.
 - This also helps to explain the full tuition refund policy of three of the eight large New Jersey employers interviewed: continuing education for a heterogeneous staff is very important.
- A potential business opportunity for a programming school would be to serve as a training center for such internally recruited staff.

E. EMPLOYER ATTITUDES TOWARD TRAINING PROGRAMS

- Employers generally have good attitudes toward specific educational programs, as shown in Exhibit III-24.
 - Large New Jersey employers have a very high regard for degree programs, but almost as high an opinion of company schools (presumably, heavily influenced by Chubb).
 - It is interesting that, when given particular programs to relate to, attitudes are more positive than when rating education in general, as shown in Exhibit III-21.
 - The profile of attitudes toward education in general, as shown in Exhibit III-21, closely parallels that toward for-profit schools, as shown in Exhibit III-24. It is significant that for-profit schools advertise heavily and, deservedly or not, are usually looked down on.
 - A lesson from this attitude is that schools like CDC's would have to distance themselves from the "matchbook cover" advertisers in all their marketing, to both students and employers.
- Although the interview process specifically probed for awareness of and attitudes toward specific schools, there was practically no awareness of specific schools.
 - This is undoubtedly because even the largest installation interviewed (40 programmers) would be hiring relatively few programmers in the course of a year, while the average large installation (10 programmers) would be hiring, at the most, two or three entry level programmers a year.

EXHIBIT III-24

EMPLOYER ATTITUDES
TOWARD TRAINING PROGRAMS

EMPLOYER SIZE*	RATING OF ATTITUDE TOWARD**					
	MA	BA	AA	DEGREE SCHOOL	FOR PROFIT SCHOOLS	COMPANY SCHOOLS
New Jersey						
Under 100	3.8	3.8	3.7	2.7	2.7	2.7
100-499	4.0	3.8	3.5	3.0	2.8	2.8
500 and Over	4.6	4.6	4.5	3.9	3.3	3.8
New York City						
500 and Over	4.0	4.0	4.0	4.0	2.4	3.6
Employers 500 and Over	4.4	4.4	4.3	3.9	2.9	3.7
All Employers	4.2	4.1	3.8	3.4	2.7	3.1

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

**1 = LOW, 5 = HIGH

- Their awareness of and focus on particular programming schools would necessarily be low.
 - This means that CDC would have to wage a vigorous image awareness campaign when initially beginning commercial operations.
- When it comes to the construction of a data processing education course, employers preferred a minimum of a three-month (full-time equivalent) course, with the weight of response leaning toward the longer six-month course, as shown in Exhibit III-25.
 - Note: The current CDC course is three months.
- Employers also wanted to see the course heavily weighted toward the "basics," as shown in Exhibit III-26:
 - Principals and concepts.
 - Languages: COBOL, Assembler, and RPG.
 - Program writing and debugging.
- Employers wished to see roughly the same amount of time allocated to programming principles, language instruction, and program writing; very small amounts of time were seen as necessary for other activities, as shown in Exhibit III-27.
- When asked what they saw as trends, an appreciable number of employers saw a trend toward more education, especially degree programs, as shown in Exhibit III-28.

EXHIBIT III-25

PREFERRED LENGTH
OF TRAINING COURSE
(percent)

EMPLOYER SIZE*	MONTHS**				
	TWO	THREE	THREE TO SIX	SIX	SIX TO TWELVE
New Jersey					
Under 100	0	0	17%	83%	0
100-499	0	67%	17	17	0
500 and Over	13%	37	0	50	0
New York City					
500 and Over	0	20	40	20	20%
Employers 500 and Over	8%	31%	15%	38%	8%
All Employers	4%	32%	16%	44%	4%

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

**FULL TIME EQUIVALENT.

NOTE: OPEN-ENDED QUESTION

EXHIBIT III-26

IMPORTANCE OF DP
TRAINING PROGRAM COMPONENTS

COMPONENT	IMPORTANCE TO EMPLOYER*	
	ALL FIRMS	LARGE NJ FIRMS
Data Processing Concepts	3.9	4.1
Principals of Programming	4.0	4.1
Specific Programming Languages	3.9	4.1
- COBOL	3.2	3.4
- FORTRAN	1.2	1.1
- ASSEMBLER	2.6	3.5
- BASIC	1.4	1.1
- Other (Mainly RPG)	3.0	3.0
Programming Techniques and Debugging	2.8	3.4
Writing Programs	3.6	3.8
Teleprocessing	1.5	1.9
System Analysis	2.2	1.5
IBM Operating Systems and Utilities	2.1	2.5
- OS	2.1	2.3
- DOS	2.5	3.3
JCL	2.0	2.4
- OS	1.9	2.1
- DOS	2.2	3.1

*1 = LOW, 5 = HIGH

EXHIBIT III-27

DESIRED COMPONENTS
OF A TRAINING PROGRAM

EMPLOYER SIZE*	EMPLOYERS' PREFERENCE FOR THE PERCENT OF TIME ALLOTTED TO				
	PROGRAM- MING PRIN- CIPLES	PROGRAM- MING LANGU- AGES	PROGRAM WRITING	JCL/ OPERA- TIONS SYSTEMS	SYSTEMS ANALYSIS
New Jersey					
Under 100	28%	24%	32%	4%	13%
100-499	23	33	28	0	9
500 and Over	29	44	9	11	8
New York City					
500 and Over	25	44	22	7	2
Employers 500 and Over	28%	44%	15%	9%	4%
All Employers	27%	36%	22%	6%	7%

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

EXHIBIT III-28

DP EDUCATION TRENDS FORESEEN BY EMPLOYERS

TREND	PERCENT OF RESPON- DENTS *
More Degree Programs	40%
More Nondegree Programs/Trade Schools	20
"More," in General	16
On-The-Job Training	12
In-House Training	12
More Outside Training	12
Other/Don't Know	12

*SOME RESPONDENTS SAW MORE THAN ONE TREND, THEREFORE TOTAL IS MORE THAN 100%.

NOTE: OPEN-ENDED QUESTION

IV PROGRAMMING SCHOOLS

IV PROGRAMMING SCHOOLS

- The enrollment in the programming schools interviewed is shown in Exhibit IV-1.
 - Except for Brookdale the completion rates are high. These high completion rates are a combination of:
 - . Financial incentives (for commercial school students).
 - . Personal motivation.
 - . Relatively small initial public enrollment, except for Brookdale.
- The length of the courses offered is consistent among those interviewed, as shown in Exhibit IV-2.
 - Five or six months for commercial schools.
 - Two years for public schools (leading to an AA).
 - . The two-year and six-month courses are roughly equivalent in terms of instructional time.
 - CDC's three-month course is on the short side by comparison.

EXHIBIT IV-1

NUMBER OF STUDENTS IN ENTRY LEVEL PROGRAMMING COURSES

SCHOOL	NUMBER OF STUDENTS	
	BEGIN COURSE	FINISH COURSE
Brick	50*	40*
Chubb	200	180
School of Data Processing	250	200
ECPI**	100	80
Total Private	600	500
Ocean County	40	30
Somerset County	30	25
Mercer Community	12	10
Brookdale Community	300	70
Monmouth College	38	30
Total Public	420	165
Total	1,020	665
Total in Primary Area	920	585

*INPUT ESTIMATE.

**NOT SERVING FOUR-COUNTY AREA.

EXHIBIT IV-2

COURSE LENGTH AT PROGRAMMING SCHOOLS

- Private
 - Brick Six Months (620 Hours)
 - Chubb Six Months - Full Time
 - School of DP Six Months - Full Time
 - ECPI Five Months - Full Time
- Public
 - All Two (2) Year AA Course

- The student profile of the schools interviewed is remarkably similar, as shown in Exhibit IV-3.
 - It is not surprising that reported placement rates are high (80-90%).
- The tuition policies within the two groups are similar, as shown in Exhibit IV-4.
 - The public institutions are considerably cheaper, but, of course, take four times as long to complete.
- The hardware used by, or accessible to, the schools is generally adequate, as shown in Exhibit IV-5.
 - The School of Data Processing and Ocean County are somewhat at a disadvantage in not offering IBM experience.
 - Brick, Chubb, Somerset, Mercer, and Brookdale all offer experience on a 3031 or 4300, which is most desirable.
- The schools generally are quite attuned to their market in terms of courses offered; Exhibit IV-6 takes the employer attitude data from Exhibit III-26 and compares analogous school weights. The highs and lows track very closely.
 - The schools' favoring of BASIC and FORTRAN largely reflects the academic bias of some of the public institutions.
- There were differences in response by schools in regard to the types of employers where placements were made.
 - Four public and one commercial school saw the major employment sources for their students as small, low-paying companies.
 - The major commercial schools were not communicative on this subject, almost certainly viewing this information as a key proprietary edge.

EXHIBIT IV-3

STUDENT PROFILE IN PROGRAMMING COURSES

- Mid to Late 20s.
- Some work experience.
- Some college.
- Highly motivated.
- Drawn from local area of school.

EXHIBIT IV-4

TUITION

- Public institutions.
 - \$20 per credit.
- Private institutions.
 - \$3,600 (Chubb, ECPI).
 - \$2,000 (School of Data Processing).
- All offer loans, assistance (via government programs), and deferred payment.

EXHIBIT IV-5

HARDWARE USED BY SCHOOLS

SCHOOL	HARDWARE
Brick	4331*, System 34
Chubb	360, 370, 3031*
School of Data Processing	Wang VS
ECPI	360, System 34
Ocean County	Univac 9080
Somerset County	4331*
Mercer Community	4341*, PDP 11/45
Monmouth College	360
Brookdale Community	Magnuson (4300 equivalent)*

*MORE DESIRABLE

EXHIBIT IV-6

IMPORTANCE OF DP TRAINING PROGRAM COMPONENTS - EMPLOYERS VERSUS SCHOOLS

COMPONENT	IMPORTANCE*		
	TO EMPLOYERS		TO SCHOOLS
	ALL FIRMS	LARGE NJ FIRMS	
Data Processing Concepts	3.9	4.1	4.7
Principals of Programming	4.0	4.1	4.7
Specific Programming Languages	3.9	4.1	4.8
- COBOL	3.2	3.4	5.0
- FORTRAN	1.2	1.1	2.8
- ASSEMBLER	2.6	3.5	4.1
- BASIC	1.4	1.1	3.4
- Other (Mainly RPG)	3.0	3.0	3.5
Programming Techniques and Debugging	2.8	3.4	2.9
Writing Programs	3.6	3.8	3.9
Teleprocessing	1.5	1.9	1.5
System Analysis	2.2	1.5	2.2
IBM Operating Systems and Utilities	2.1	2.5	2.6
- OS	2.1	2.3	-
- DOS	2.5	3.3	-
JCL	2.0	2.4	2.5
- OS	1.9	2.1	-
- DOS	2.2	3.1	-

*1 = LOW, 5 = HIGH

- From CDC's standpoint, the most valuable statement came from a local public competitor which saw:
 - . Relatively few local placements.
 - . Many consulting firm placements.
- The strengths and weaknesses of programming schools, as reported by the schools themselves, are shown in Exhibit IV-7.
 - The degree is valued highly by the public schools (and one commercial school).
 - Commercial schools are perceived as being faster and cheaper by two public schools.
 - Two schools believe public schools do a better placement job.
 - From CDC's standpoint two statement are especially important.
 - . Company schools are not being perceived to be "real" schools.
 - . "INSCO" being grouped with Brick as having an "inferior reputation."

EXHIBIT IV-7

STRENGTHS AND WEAKNESSES - AS SEEN BY SCHOOLS

TYPE OF SCHOOL	STRENGTHS	WEAKNESSES
Commercial	Faster (2-P) Cheaper (2-P) Aimed at Business (1-C)	Company Schools "Not in School Business" (1-C) "INSCO," Brick have "Inferior Reputation" (1*) No Degree (3-P, 1-C) Worse Placement (1-P)
Public	Degree (3-P, 1-C) Better Placement (1-C)	Can't Focus on DP (1-C)

*IDENTIFICATION WITHHELD

NOTE: THE NUMBER OF RESPONDENTS GIVING THE RESPONSE TO AN OPEN-ENDED QUESTION IS SHOWN IN PARENTHESES.

- THOSE MADE BY A PUBLIC SCHOOL ARE INDICATED BY "P."
- THOSE BY COMMERCIAL SCHOOLS BY A "C."

V MARKET ESTIMATES

V MARKET ESTIMATES

- There are about 1,600 employers with more than 50 employees per site in the four-county area, as shown in Exhibit V-1.
 - About half are in Middlesex County.
 - Under one-third are in Ocean and Monmouth.
- Taking this employer base and the previous findings in this study, as shown in Exhibits III-1 and III-2, the estimated commercial programmer population is about 1,900, as shown in Exhibit V-2.
 - Because of job definition issues within employers and sampling variations in a study such as this, this estimate could be 10-20% away from the "true" programmer population.
 - Allied to the sampling issue is whether there might be a number of very large programmer employers involved in commercial data processing who could impact these figures by much more than 10-20%. Such employers might also have radically different views toward programmer education.
 - To test this hypothesis CDC supplied a list of firms that it believed were programming "giants"; i.e., employing 50 or more programmers.

EXHIBIT V-1

EMPLOYERS IN FOUR-COUNTY AREA

COUNTY	NUMBER OF ESTABLISHMENTS			
	50-99*	100-499*	500 AND OVER *	TOTAL
Mercer	173	144	30	347
Middlesex	396	325	50	771
Monmouth	227	118	19	364
Ocean	83	56	8	147
Total	879	643	107	1,629

*NUMBER OF EMPLOYEES AT THE ESTABLISHMENT (i.e., ONE LOCATION)

SOURCE: 1978 COUNTY BUSINESS PATTERNS - NEW JERSEY (EXCLUDES FEDERAL GOVERNMENT)

EXHIBIT V-2

ESTIMATED COMMERCIAL PROGRAMMER POPULATION IN FOUR-COUNTY AREA

EMPLOYER SIZE*	(A) NUMBER OF EMPLOYERS	(B) PERCENT WITH PROGRAM- MERS	(C) AVERAGE NUMBER OF PROGRAM- MERS	(D) TOTAL PROGRAM- MERS
50-99	879	22%	3	580
100-499	643	45	1.3	376
500 and Over	107	83	10.6	941
TOTAL	1,629	-	-	1,897

*NUMBER OF EMPLOYEES AT INTERVIEWED LOCATION.

NOTE: DOES NOT INCLUDE FEDERAL ESTABLISHMENTS.

A x B x C x D

- . Exact or approximate programming staff sizes could be ascertained for all but two firms on the list. None of the others employed more than 50 programmers, as shown in Appendix C.
- . Bell Labs (Holmdel) is a partial exception in that they have a very large programming staff (at least 750); however, this staff is largely involved in scientific and engineering programming and would not have much use for CDC's course of study. More importantly, Bell Labs has a "not invented here" attitude toward the purchase of all outside services. According to a source that has observed this Bell Labs operation for several years, they are very inward looking and are not receptive to things from the outside. It is unlikely that Bell Labs would be a good market for CDC programmer training graduates.
- . This test indicates that there are few, if any, such exceptional firms.
- . Even if, say, Johnson & Johnson turned out to need 50 trainees per year it would be unwise to depend on any single employer to absorb more than a small portion of a school's graduates.
- Employer Demand: Exhibit V-3, showing employer demands, lists the assumptions behind the calculation showing that employers in the four-county area hire somewhat more than 100 entry level programmers with prior formal training.
 - This figure could rise to 300 if all entry level programmers received formal training.
- Supply: Supply is not just the number of graduates of local programming schools, but must also take into account placement rates.
 - There is the school's overall placement rate.

EXHIBIT V-3

EMPLOYER NEEDS FOR ENTRY LEVEL PROGRAMMERS

- Assumption
 - 2,000 commercial programmers in four-county area (Exhibit V-2)
 - 30% hiring need; 25% turnover and 5% growth (Turnover: see III A)
 - 50% of hires are entry level (Exhibit III-10)
 - 35% of hires have formal training (Exhibit III-20)
- Overall need calculation
 - $2,000 \times 0.32 \times 0.50 = 300$ entry level commercial programmers
- Programming school graduates hired
 - $300 \times 0.35 = 105$ entry level programmers with formal training

- In addition, some of the schools involved end up placing their students in operations or administrative positions associated with data processing, but which are not professional positions.
- Finally, some schools due to the nature of their geography (e.g., Chubb) will place many of their students in other parts of New Jersey or even in Manhattan.
- Exhibit V-4 takes all these factors into account (making estimates where required).
 - . The net result is an estimate of school placement rates into the four counties.
- Supply versus Demand: The figures developed here indicate an excess of supply over demand (i.e., 162 versus 105). This is probably not a real problem, except for marginal graduates of marginal schools. The difference can be accounted for by a combination of these factors:
 - Overstatement of student figures and placement ratios by schools.
 - Understatement by employers of the extent of prior training of entry level staff.
 - Higher rates of employment of school graduates outside the four-county area.
 - If the above factors varied by as little as 10% it would change the apparent surplus into an undersupply.

EXHIBIT V-4
SCHOOL PLACEMENT RATES

SCHOOL	OVERALL PLACEMENT			PROGRAMMER PLACEMENT		FOUR COUNTY PLACEMENT	
	NUMBER OF GRADUATES	PERCENT	NUMBER	PERCENT*	NUMBER	PERCENT*	NUMBER
Brick	40*	80%	32	25%	8	100%	8
Chubb	180	80	144	90	130	25	32
School of DP	200	95	190	20	38	50	19
Ocean County	30	80	24	75	18	100	18
Somerset County	25	90	23	75	17	50	9
Mercer Community	10	90	9	75	7	75	5
Brookdale Community	70	98	68	75	51	100	51
Monmouth College	30	90	27	75	20	100	20
Total	585	-	517	-	289	-	162

* INPUT ESTIMATE

VI FINDINGS AND RECOMMENDATIONS

VI FINDINGS AND RECOMMENDATIONS

A. KEY FINDINGS

I. GENERAL FINDINGS

- Positive findings include:

- There are at least 2,000 programming positions involved in commercial data processing applications in CDC's market area.
 - Programmer turnover is a problem that could be reduced by training.
 - Data processing management does not come to this conclusion without prompting, but recognizes it when it is pointed out. Consequently, there is a long-range marketing opportunity for the right program.
- Firms hire significant numbers of entry level programmers, although they might wish to hire fewer.
 - As long as there continues to be significant growth in overall programmer numbers, there will continue to be a need for entry level programmers.

- . Current rates of growth should continue for at least 10 years.
- Employers have positive views toward individual sources of programmer education.
 - . Degree programs are viewed most favorably, but company schools rank almost as high.
- Reported placement rates are high.
 - . This is a fact of critical importance and is the best measure of market acceptance.
 - . It is possible that schools are valued more by both students and employers for their "employment agency" function than for their education or training function.

● Negative findings include:

- A relatively low opinion by employers toward formal education in general.
- An inclination by employers to use on-the-job training and printed material rather than classroom training.
- A current propensity to hire entry level programmers who lack formal training.
- The fragmentation of the "buying units." Even most large data processing installations in the four-county area would only hire several entry level programmers a year.

2. SPECIFIC FINDINGS AFFECTING CDC

- Course length.

- The CDC course length, at three months, is just competitive. All things being equal, many employers would view a six-month course more favorably.

- Course content.

- The overall content of the course is satisfactory.
- The IBM mainframe environment is desirable, although not a striking advantage over most of the competition.
- An OS orientation would make the offering marginally less competitive.

- CDC identification.

- Currently, the CDC affiliation is probably a neutral factor in the marketplace. The survey results showed a tendency to favor company schools; however, there was no knowledge of CDC, either as identified with Continental or with "INSCO."
 - There may be some minor initial problems caused by the few CDC graduates who, being marginal students, were not hired by CDC and found employment elsewhere.

- Placement.

- The only specific report on placement difficulties was by a school relatively close to CDC. Their students could not find jobs in the area.

- . This is an almost inescapable product of CDC's geographical position and will only be solved by future business growth and relocation into the area.
- . Overcoming this position will call for a careful student recruitment policy.

B. CDC STRATEGIC ISSUES

I. IMPACT ON CDC

- The effect on CDC recruitment of "opening up" the CDC training center to conventional students will have to be carefully evaluated.
- Currently, the CDC basic programming course is a critical conduit for maintaining CDC staffing levels. Any disturbance of this by outside "irritants" could produce one or both of these effects:
 - Recruitment rates for CDC might drop, causing vacancy rates to increase and workload capacity to suffer.
 - CDC might have to increase salary levels for entry level programmers and, possibly, for all staff (to maintain differentials).
- An outside irritant might be students planning placement elsewhere, in jobs that were perceived to be better in terms of salary, work content, opportunity, etc.
 - This could be indirect, by means of one student talking to another.
 - It could be direct, by means of employer recruitment aimed at all CDC students.

- CDC could deal with this problem by one or more of the following:
 - Recruiting CDC-intended students from south of Neptune, and those intended for other employers from the north and northwest.
 - However, even students from the south might consider relocating if their ties to the community were not strong.
 - Setting up geographically distinct facilities for training students intended for out-placement.
 - This would be a good marketing tactic also, since that part of the training center would then be closer to both its source of student supply and employer customers.
 - However, this would be administratively complex and more expensive.
 - Having classes for out-placement students at a different time than for regular students.
 - The course would take longer and, perhaps, greatly reduce the student supply.
 - Either of these last two courses of action would be hard to start on a small scale, since the fixed costs would be relatively large.

2. RELATIONS WITH POTENTIAL EMPLOYERS

- Potential employers-customers would always fear that CDC would skim off the best students.

- The only feasible approach is the one used at Chubb, where CDC establishes a self-denial policy against hiring students who have entered CDC on their own.
- It would still be possible to mix outside students with previously hired CDC trainees, however:
 - . The problems described in the previous section would still exist.
 - . CDC would then have to pay three months' salary to students that it does not now pay.

C. RECOMMENDATIONS

- There is no insuperable market barrier to entering the training market.
 - While the market does not perceive that it has an overpowering need, current producers are able to place graduates successfully.
 - The strategic issues raised in the previous section appear to be more critical.
 - . If these issues are not addressed correctly, even the most successful training product will produce a large net loss to CDC.
- If CDC decides to go ahead, INPUT recommends that the venture be set up along these lines:
 - Start as small as possible, but geographically distinct from the current training site.

- When the time comes to expand, consider sites much closer to important employers, especially those not close to Chubb.
- Marketing and closely associated market research will be critical to success.
 - Customers must be identified and continually reinforced. A certain minimum amount of human contact will be required.
 - The first batch of graduates must be carefully recruited and equally carefully placed in promising circumstances.
 - The progress of these graduates should be carefully tracked. The employers who have recently hired entry level programmers without prior training should be encouraged to compare the progress of the two types of personnel.
- Large employers should, naturally, be the chief targets. However, where inexpensive marketing is possible, there is no reason to exclude smaller companies as customers.
 - Personal calls and visits should be confined to large employers.
 - Direct mail (after initial qualification), group seminars, and facility tours should be aimed at a much larger selection of companies.
- CDC should explore with employers the training of entry level staff selected by the customers. These students could be:
 - Upgraded nonprofessional DP staff.
 - Company transfers.

- . New hires.
- . "Customer-identified" students, whom the employer has agreed to hire if they complete the course satisfactorily. This way the employer would not have to pay a salary to the student until the student was trained.
- CDC should consider offering a few advanced courses aimed at experienced programmers.
 - . This would build up an image of competence more quickly among customer companies.
- Considerable attention should also be paid to the cost side of the venture: CDC should explore innovative methods of training which lower the amount of necessary human labor. For example:
 - . Deltek-type courses.
 - . Computer-aided instruction.
- If CDC could develop such an innovative approach, there might be far more profit potential (and a means of breaking through the geographic barriers) by selling software rather than traditional classroom instruction.

APPENDIX A: EMPLOYER QUESTIONNAIRE

PROGRAMMER TRAINING QUESTIONNAIRE: EMPLOYERS

1. We are conducting a study on programmer education, including the need for it and how it can be improved.

How many programmers are employed at this location?

(IF NONE, TERMINATE INTERVIEW.)

2. First, I would like to get a brief overview of your company.

• How many employees does the company have? _____

- At this location? _____

• What is the principal business activity(ies) at this location?

3. What kind of hardware is used by the programming staff? (NOTE: The hardware does not have to be physically located at this site.)

• Mainframe manufacuter and model:

- Operating system.

• MVS.

• DOS.

• CMS.

• Other.

- Is TSO used? () YES () NO

- 4a. What is the actual distribution of programming experience in your programming staff, compared to your goals. That is, what percent of the programming staff have:

	(A) <u>ACTUAL</u>	(B) <u>GOAL</u>
Under 1 years' experience?	_____	_____
2 to 3 years' experience?	_____	_____
4 to 5 years' experience?	_____	_____
6 or more years experience?	_____	_____

- 4b. If the actuals and goals are considerably far apart:

- Why?
- What is being done about it?
- How much does (or will) training compensate for this gap? (Encourage discussion.)

5. How many programmers did you hire in 1980 and how many do you expect to hire in the coming 3 years; and how many do you expect will be entry level (i.e., trainees)?

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Total programmers hired.	_____	_____	_____	_____
Entry level.	_____	_____	_____	_____

6a. What has programmer turnover been in the last three years?

1979

1980

1981 (ANNVALIZED)

- If there are differences, why?

6b. What are the principal reasons for programmers leaving (1=low important, 5=high importance)

- Relocation. _____
- Salary, benefits. _____
- Working conditions. _____
- Lack of opportunity. _____
- Installation not "state of the art." _____
- Unable to increase skills. _____
- Encouraged to leave. _____
- Personal (e.g., pregnancy). _____

6c. What are you doing to reduce turnover?

6d. What role would improved training (either before or after hiring) have on turnover (discuss)?

7a. Please describe the profile of the typical programmer that your firm would prefer to hire.

- Level of general education (e.g., B.A.).
- Extent of formal data processing or programmer training (describe).
- Experience.
 - Years in data processing.
 - Hardware experience.
 - Programming languages.
 - Other software experience.
 - Knowledge of specific applications.
- Other, e.g., distance from work.

7b. For what percent of new hires is this profile your goal?

_____ %

- About what percent of those actually hired actually come fairly close to meeting the profile? _____ %
- Why are you so far from (or close to) your goal?

8. How important to your firm are the following ways of hiring programmers?
(1=low importance, 5=high importance.)

<u>METHOD</u>	<u>IMPOR- TANCE</u>	<u>WHY?</u>
Internal transfers.	_____	_____
Upgrading non-professional DP staff.	_____	_____
Referrals from current staff.	_____	_____
Walk-ins or unsolicited resumes.	_____	_____
Newspaper ads.	_____	_____
Employment agencies.	_____	_____
Cooperative education programs.	_____	_____
Degree programs in DP.	_____	_____
Commercial programming schools.	_____	_____
Other (Name: _____).	_____	_____

9a. Do you ever hire programmer trainees?

() YES () NO

Why?

9b. If yes, have they generally had:

- Formal training?

() YES () NO

- Previous experience (even if unpaid)?

() YES () NO

9c. If no, what is the least skilled level of personnel you do hire, in terms of experience and DP education?

9d. How much weight do you give to formal training? (1=low, 5=high) _____

9e. Do you test their level of achievement?

() YES () NO

Why?

- If yes, what factors appear to be responsible for high and low scores, e.g., kind of training, general intelligence, socio-economic background, etc.?

10a. What is your firm's general policy on paying for programming education courses and released time for programmer education (either on- or off-site)?

ANNUAL AVERAGE
PER EMPLOYEE?

CONDITIONS ON
RECEIVING?

- Company Payment \$ _____ \$ _____
- Released Time _____ days _____ days

10b. About how much is spent on DP education now and will be spent in 1983?

\$ _____ (or percent of budget _____)

11. How important are the different types of programmer education for your firm (i.e., how much is each used)?

<u>TYPE OF EDUCATION</u>	<u>IMPOR- TANCE</u>	<u>WHY?</u>
On-premises video tapes.	_____	_____
Programmed instruction manuals.	_____	_____
Other manuals.	_____	_____
Books.	_____	_____
Classes/seminars (outside lecturers).	_____	_____
- On-premises.	_____	_____
- Off-premises.	_____	_____
Internally staffed seminars.	_____	_____
On-the-job training (informal).	_____	_____
Other (describe).	_____	_____
_____	_____	_____

* 1 = low; 5 = high

12. What kind of data processing training programs in your geographic area are you familiar with in each of the categories below? What is your opinion of each, their strengths and weaknesses, and how they could be improved to serve your needs better.

CATEGORY	OPINION*	STRENGTHS	WEAKNESSES	HOW COULD BE IMPROVED
Degree Programs.				
- MA.				
- BA.				
- AA.				
Non-degree programs.				
- From degree granting institutions.				
- Independent for profit schools.				
- Company subsidiary schools.				

* 0 = none; 1 = low; 5 = high.

13. I would like your opinion on what would constitute an optimum amount of entry level programmer training (i.e., for people with little or no previous exposure to data processing).
- 13a. How much time should the training program take? (Since some courses are full time and others are part time or on a semester basis, please answer in term of total hours or 40-hour weeks; Note: A course that meets 3 hours a week for a semester would be approximately equivalent to one 40-hour week.)

13b. What should be the specific components of such a program? Of the list of program components tell me how important you believe each to be on a scale where 1 = low importance and 5 = high importance.

<u>COMPONENT</u>	<u>IMPOR- TANCE</u>	<u>WHY?</u>
Data Processing Concepts.	_____	_____
Principals of Programming.	_____	_____
Specific Programming Languages.	_____	_____
- COBOL.	_____	_____
- FORTRAN.	_____	_____
- Assembler.	_____	_____
- BASIC.	_____	_____
- Other. _____	_____	_____
Programming Techniques and Debugging.	_____	_____
Writing Programs.	_____	_____
Teleprocessing.	_____	_____
System Analysis.	_____	_____
IBM Operating Systems and Utilities.	_____	_____
- OS.	_____	_____
- DOS.	_____	_____
- Other. _____	_____	_____
JCL.	_____	_____
- OS.	_____	_____
- DOS.	_____	_____
- Other. _____	_____	_____

13c. What percent of the course of study do you think should be devoted to:

	<u>PERCENT</u>
Principles of programming.	_____
Learning program languages. _____	_____
Writing programs.	_____
Learning JCL and operating systems.	_____
System Analysis.	_____
Other (describe) _____	_____
	100%

14. What trends do you see in the next 3-5 years occurring in programmer education?

- For entry level programmers?
- For experienced programmers?

APPENDIX B: SCHOOL QUESTIONNAIRE

PROGRAMMER TRAINING QUESTIONNAIRE: SCHOOLS

I. First, I would like a profile of your school and its offerings.

Ia. When did you begin offering courses in data processing?

Ib. Do you offer degree programs?

() YES () NO

• If yes:

DEGREE TYPE(S)
BA, AA, etc.

CONCENTRATIONS OFFERED

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Id. Of this number of students, what is the breakdown between entry level students and those already experienced in data processing in the categories below:

	<u>NUMBER OF STUDENTS</u>	
	<u>ENTRY LEVEL</u>	<u>PREVIOUS EXPERIENCE</u>
Computer Operations (Data entry, operator)	_____	_____
Programming	_____	_____
Systems Analysis	_____	_____
Other _____	_____	_____

NOTE: Total of numbers here should equal answer in "c" above.

Ie. Why do students select your institution?

- Entry level?
- Experienced?

If. In your opinion why do entry level programming students choose the data processing field?

lg. How would you describe your typical entry level programming student in terms of:

- Age.
- Prior work experience.
- Prior level of education.
- Motivation.
- Distance from your school.

lh. What is your fee structure?

- Does your school provide financial assistance?
 - Loans.
 - Deferred payment.
 - Reduced fees.
 - Other.

li. What types of equipment do you provide training on?

2a. Do you have an entry level programmer course of study or group of classes that you recommend for students with little or no previous background in data processing?

() YES () NO

• If no, why not?

• If yes, what does the program consist of in terms of specific courses/modules and their length, in classroom hours? (Note to interviewer: Following list can be used to organize replies and to prompt respondent.)

<u>ENTRY LEVEL COURSE COMPONENTS</u>	<u>HOURS</u>
Data processing concepts.	_____
Principles of processing.	_____
Programming languages.	_____
- COBOL.	_____
- FORTRAN.	_____
- Assembler.	_____
- BASIC.	_____
Other. (_____)	_____
Programming techniques and debugging.	_____
Program writing practice.	_____
Teleprocessing.	_____
Principles of systems analysis.	_____
IBM operating systems and utilization.	_____
- Which operating system(s).	_____
JCL.	_____
- Which operating systems.	_____
Other.	_____

2b. How many students start this course of study annually? _____

- How many complete it annually? _____

2c. Do you see your entry level programming course of study changing in the next 3 years?

() YES () NO

- Why?

- If yes, in what ways?

2d. What changes or trends do you see in entry level programmer education in general?

3a. About what percent of students who complete your entry level programming course of study find paid programming employment soon (i.e., 3 months) after completion of your course?

- If less than 100%: Why do the other students not find jobs?

3b. What type of placement assistance does your school offer?

3c. What percent of your students are placed through your program?

4a. What type of courses do you offer experienced programmers? Which ones are the most popular in terms of enrollment?

<u>COURSE NAME</u>	<u>CLASSROOM HOURS</u>	<u>POPULAR (1=LOW, 5 = HIGH)</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

4b. What are the trends in these types of courses offered?

- At your institution?
- Generally?

- 5a. What other types of institutions offer entry level programmer education in your area (e.g., degree programs, non-degree programs, commercial schools)?
- 5b. What would you say the strengths and weaknesses of the other types of institutions are, compared to your own entry level training program.

OTHER PROGRAMS
(FROM 5)

STRENGTHS

WEAKNESSES

- 6a. Do you find that employers are more or less willing to hire entry level programmer (i.e., trainees) who have had formal training but no actual experience?

() More () Less
() Same

- Why?
- What type of employers seems to be the most willing to hire programmer trainees that have had training but no experience? (Prompts: Size, location, industry, low pay scales, etc.)

6b. Does your entry level programmer training meet the needs of employers?

() YES () NO

() PARTLY

• If yes, how do you know? (surveys, interviews, etc.?)

• If no or partly:

- What kind of changes should be made?

- How do you know that these particular changes should be made?

- When do you plan to make them?

APPENDIX C: ADDITIONAL COMPANIES CONTACTED

APPENDIX C: ADDITIONAL COMPANIES CONTACTED

- The following companies were also contacted (in addition to the study sample, per se) on the advice of the Continental Data Center. These were believed to potentially have large numbers of programmers and possibly have different attitudes and needs compared to other companies interviewed.

<u>Company</u>	<u>Number of Programmers at One or More Locations in Four-County Area</u>
Crum & Foster	Outside of the four counties
Johnson & Johnson	See Note A*
AT&T	0
Squibb	No location found in four counties
Dow-Jones	Interviewed in study sample
McGraw-Hill	See Note A*; according to prior CDC experience, this is not an ultra-large installation
Supermarkets General	See Note A*
Merrill Lynch	30
Ingersoll-Rand	"Under 50"
Computer Science Corporation	0
Fidelity Union Trust	"Under 50"
Merck	No location found in four counties
Colgate-Palmolive	0

Bambergers	Outside of the four counties
Amerada-Hess	25
ITT	22 (2 locations)
Prudential	Outside of the four counties
Bell Labs	

*Note A: Company was contacted in the course of the survey; no interview was conducted.

APPENDIX D: EMPLOYERS INTERVIEWED

APPENDIX D: EMPLOYERS INTERVIEWED

- Firmenich, Inc.
- Economics Laboratory.
- Argus Engineering.
- Mideast Aluminum Industries, Inc.
- National Data Systems.
- Glen Rock Lumber & Supply Co.
- Amax Cooper, Inc.
- Prince Manufacturing, Inc.
- Peterson's Guides, Inc.
- MHT Services.
- Lithoid, Inc.
- Torwico Electronics.

- Charms Co.
- Daily Racing Form.
- Dow Jones & Co.
- United Jersey Bank.
- Midlantic Bank.
- Department of Labor.
- Perkin-Elmer.
- Midland Glass.
- Harcourt, Brace, Jovanovich Publishers.
- Alexander's.
- Garan, Inc.
- Associated Dry Goods.
- Harte & Co., Inc.

APPENDIX E: SCHOOLS INTERVIEWED

APPENDIX E: SCHOOLS INTERVIEWED

- Private.

- Brick Computer Institute, Bricktown.
- Chubb Institute, Short Hills.
- School of Data Processing, Union.
- ECPI, Paterson.

- Public.

- Ocean County Community College, Toms River.
- Somerset County College, Somerville.
- Mercer Community College, Trenton.
- Monmouth College, West Long Branch.
- Brookdale Community College, Lincroft.

